

R1 = H or one of the following:

β -O Linked to the 1, 2, 3, 4, or 6 position of the adjacent monosaccharide or a linear or branched polysaccharide.

R2 = H or one of the following:

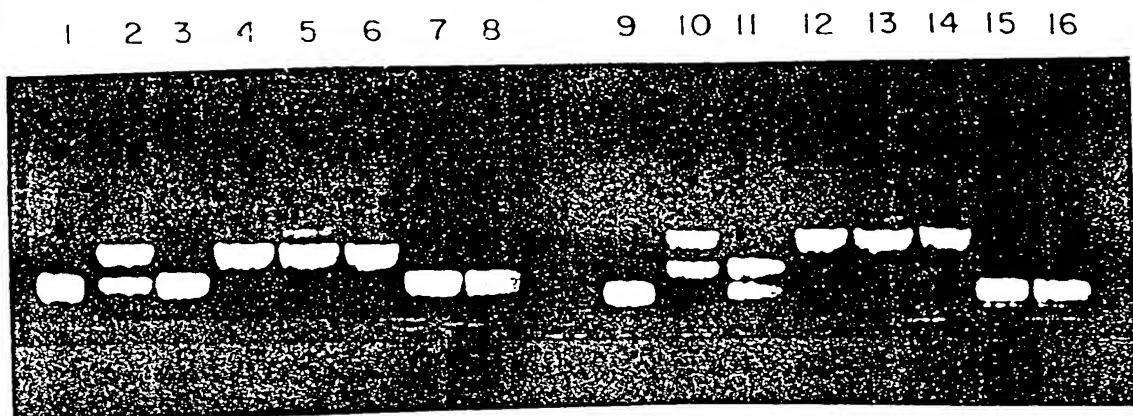
α -O Linked to the 1, 2, 3, 4, or 6 position of the adjacent monosaccharide or a Linear or branched polysaccharide.

R2-10 = H or one of the following: OH, SO_3 , phosphate, NH_2NHAc , OCH_3 , O-alkyl, CH_3 , CH-alkyl, or inorganic-alkyl; O linked to another R2-10 within the same monosaccharide.

F | G. I

113 : $\text{Gal}\beta 1\text{-}3\text{G}1\text{cNAc}\beta 1\text{-}3\text{Ga}1\beta 1\text{-}4\text{G}1\text{c-Co}$
 /
 $\text{Fuc}\alpha 1\text{-}4$

167 : $\text{Gal}\beta 1\text{-}3\text{G}1\text{cNAc}\beta 1\text{-}3\text{Ga}1\beta 1\text{-}4\text{G}1\text{c-Co}$



Substrate 113

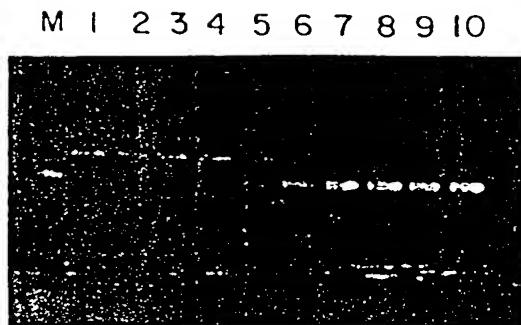
1	+	no preparation
2	+	<u>X. holcicola</u> preparation
3	+	<u>X. badrii</u> preparation
4	+	<u>X. manihotis</u> preparation
5	+	<u>X. cyanopsidis</u> preparation
6	+	<u>X. oryzae</u> preparation
7	+	<u>X. campestris</u> preparation
8	+	<u>X. campestris</u> preparation

Substrate 157

9	+	no preparation
10	+	<u>X. holcicola</u> preparation
11	+	<u>X. badrii</u> preparation
12	+	<u>X. manihotis</u> preparation
13	+	<u>X. cyanopsidis</u> preparation
14	+	<u>X. oryzae</u> preparation
15	+	<u>X. campestris</u> preparation
16	+	<u>X. campestris</u> preparation

FIG. 2

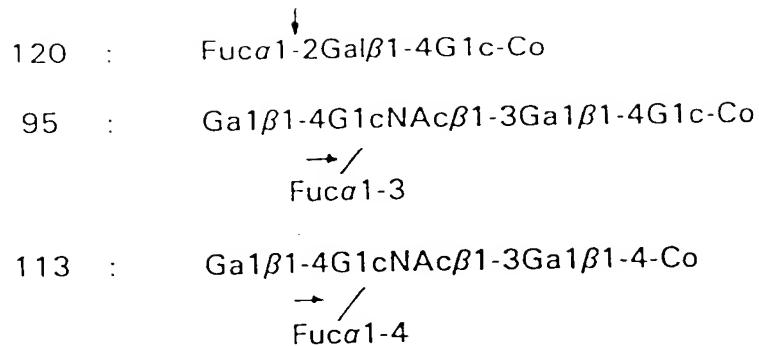
109 : \downarrow
Ga1 α 1-3Ga1 β 1-3G1cNAc-Co



Substrate 109

Lanes 1-4 = complete digest
1 = 1 μ l. of α 1-3, 6 Galactosidase
2 = 0.5 μ l.
3 = 0.25 μ l. : concentration of enzyme-4 units/ μ l.
4 = 0.125 μ l.
5-8 = partial digest
9-10 = undigested

FIG. 3



Substrate 120

- 1 + no enzyme
- 2 + α -Fucosidase II
- 3 + α -Fucosidase I

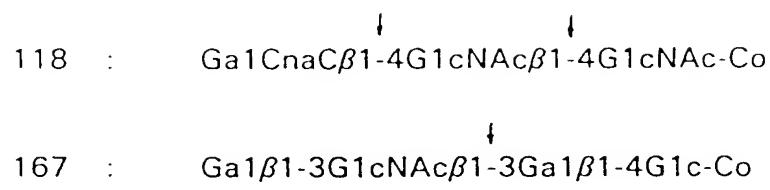
Substrate 95

- 4 no enzyme
- 5 + α -Fucosidase I
- 6 + α -Fucosidase I + β -Galactosidase (bovine testes)
- 7 + α -Fucosidase II

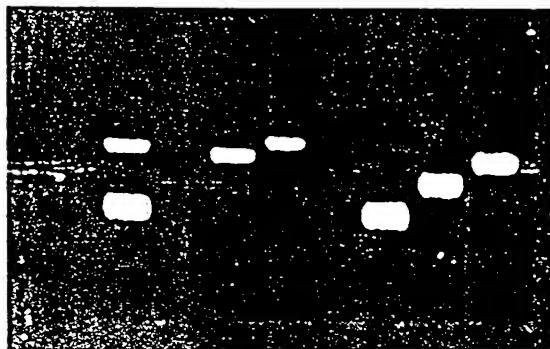
Substrate 113

- 8 no enzyme
- 9 + α -Fucosidase I
- 10 + α -Fucosidase I + β -Galactosidase (bovine testes)
- 11 + α -Fucosidase II

FIG. 4



M 1 2 3 4 5



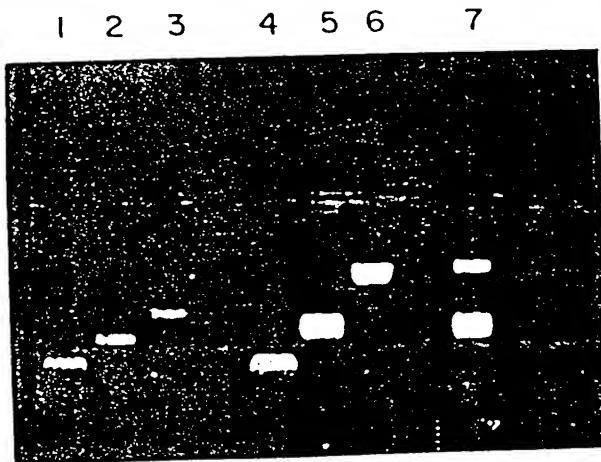
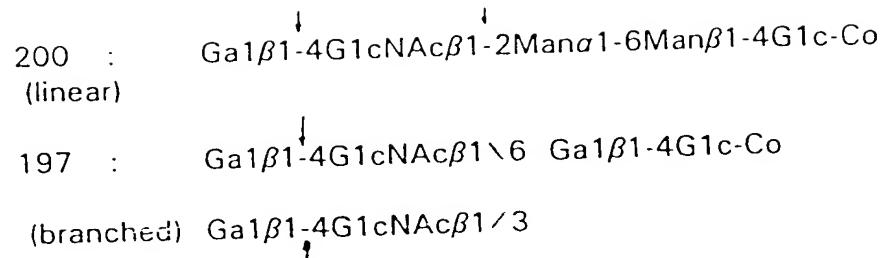
Substrate 118

1	+	no enzyme
2	+	β -GlcNAcase

Substrate 167

3	+	no enzyme
4	+	β -Galactosidase
5	+	β -Galactosidase + β -G1cNAcase

FIG.5



Substrate 200

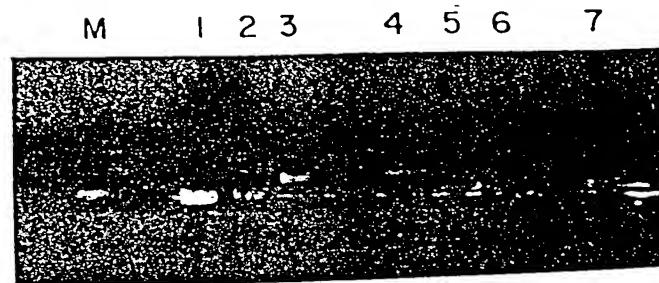
1	+	no enzyme
2	+	β -Galactosidase
3	+	β -Galactosidase + β -GlcNAcase (<u>X. manihotis</u>)

Substrate 197

4	+	no enzyme
5	+	β -Galactosidase
6	+	β -Galactosidase + β -GlcNAcase (<u>X. manihotis</u>)
7	+	Marker (92b,167)

FIG. 6

96 : $\text{Ga1NAc}\beta 1\text{-}3\text{Ga1}\alpha 1\text{-}4\text{Ga1}\beta 1\text{-}4\text{G1c-Co}$
 205 : $\text{Ga1NAc}\beta 1\text{-}4\text{Ga1}\beta 1\text{-}4\text{G1c-Co}$



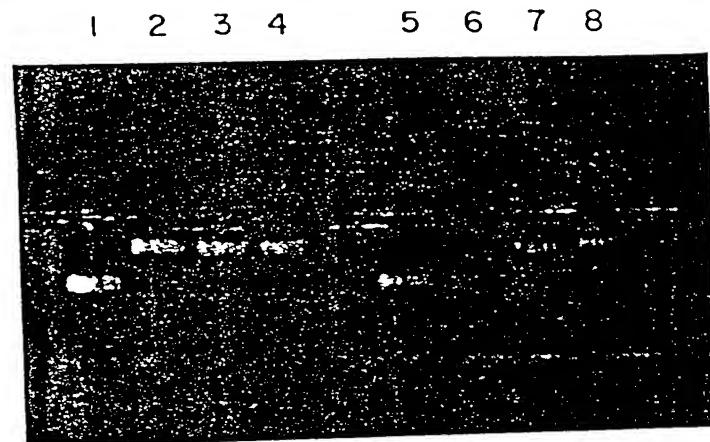
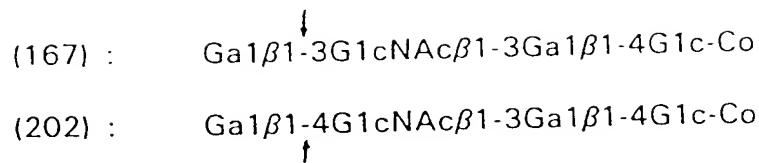
Substrate 96

1	+	no enzyme
2	+	β -GlcNAcase (<u>X. manihotis</u>)
3	+	β -GlcNAcase (bovine kidney)

Substrate 205

4	+	no enzyme
5	+	β -GlcNAcase (<u>X. manihotis</u>)
6	+	β -GlcNAcase (bovine kidney)
7	+	Marker (92b,167)

FIG. 7



Substrate 167

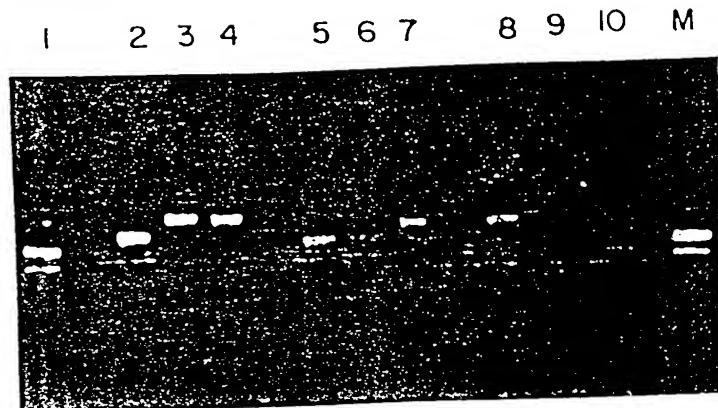
1	+	no enzyme
2	+	$\beta\text{1-3} > > 4$ Galactosidase (<i>X. manihotis</i>) at 1x concentration
3	+	$\beta\text{1-3, 4} > 6$ Galactosidase (bovine testes) at 1x concentration
4	+	$\beta\text{1-3, 4}$ Galactosidase (chicken liver) at 1x concentration

Substrate 202

5	+	no enzyme
6	+	$\beta\text{1-3} > > 4$ Galactosidase (<i>X. manihotis</i>) at 100x concentration
7	+	$\beta\text{1-3, 4} > 6$ Galactosidase (bovine testes) at 1x concentration
8	+	$\beta\text{1-3, 4}$ Galactosidase (chicken liver) at 1x concentration

FIG. 8

109 : \downarrow
 Ga1 α 1-3Ga1 β 1-3G1cNAc-Co
 193 : Ga1 α 1-4Ga1 β 1-4Gal-Co
 181 : \downarrow
 Ga1 α 1-6G1c α 1-2Fru-Co



1 Marker

Substrate 109

2	+	no enzyme
3	+	α 1-3, 6 Galactosidase (<i>X. manihotis</i>)
4	+	α 1-3, 4, 6 Galactosidase (coffee bean)

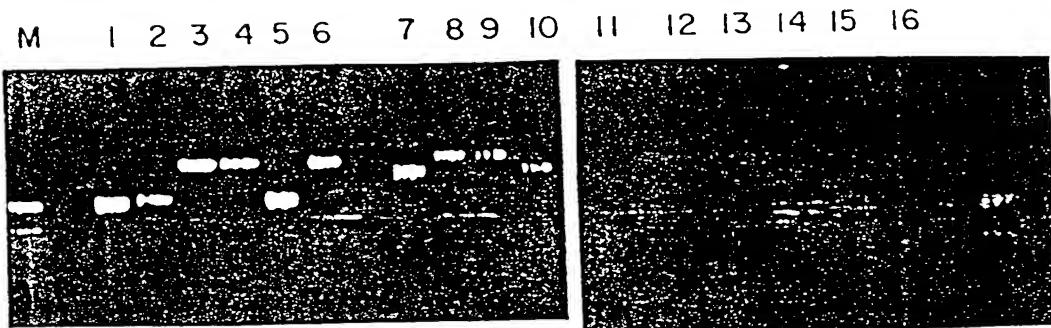
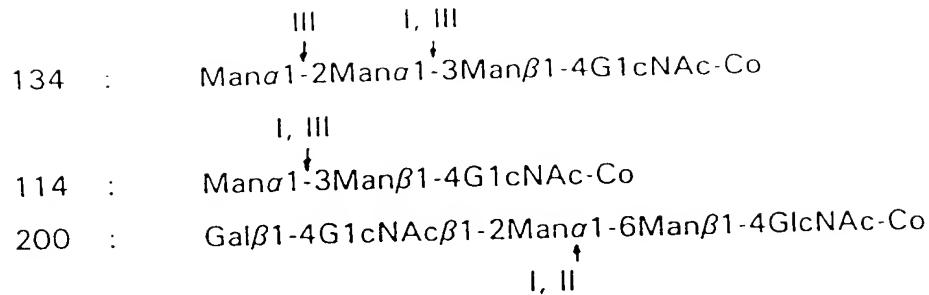
Substrate 193

5	+	no enzyme
6	+	α 1-3, 6 Galactosidase (<i>X. manihotis</i>)
7	+	α 1-3, 4, 6 Galactosidase (coffee bean)

Substrate 181

8	+	no enzyme
9	+	α 1-3, 6 Galactosidase (<i>X. manihotis</i>)
10	+	α 1-3, 4, 6 Galactosidase (coffee bean)

FIG. 9



Substrate 134

1	+	no enzyme
2	+	α -Mannosidase I (15 units, 20 hrs.)
3	+	α -Mannosidase III (15 units, 2 hrs.)
4	+	α -Mannosidase III (15 units, 20 hrs.)
5	+	α -Mannosidase II (100 units, 20 hrs.)
6	+	Jack bean α -Mannosidase

Substrate 114

7	+	no enzyme
8	+	α -Mannosidase I (15 units, 2 hrs.)
9	+	α -Mannosidase III (15 units, 2 hrs.)
10	+	α -Mannosidase III (15 units, 2 hrs.)
11	+	α -Mannosidase II (100 units, 20 hrs.)

Substrate 200

12	+	no enzyme
13	+	β -Galactosidase (bovine testes ^{OGS1})
14	+	β -Galactosidase + β -GlcNAcase
15	+	β -Galactosidase + β -GlcNAcase + α -Mannosidase I (15 units, 2 hrs.)
16	+	β -Galactosidase + β -GlcNAcase + α -Mannosidase III (15 units, 2 hrs.)
17	+	β -Galactosidase + β -GlcNAcase + α -Mannosidase II (15 units, 2 hrs.)

FIG. 10

179 : $\text{Glc}\beta 1\text{-}4\text{Glc}\beta 1\text{-}4\text{Glc-Co}$ 180 : $\text{Glc}\alpha 1\text{-}4\text{Glc}\alpha 1\text{-}4\text{Glc-Co}$ 118 : $\text{GlcNAc}\beta 1\text{-}4\text{GlcNAc}\beta 1\text{-}4\text{GlcNAc-Co}$ 202 : $\text{Gal}\beta 1\text{-}4\text{GlcNAc}\beta 1\text{-}3\text{Gal}\beta 1\text{-}4\text{Glc-Co}$ 

M Marker

Substrate 179

1 + no enzyme

2 + β Glucosidase (1 unit)

Substrate 180

3 + no enzyme

4 + β Glucosidase (5 units)

Substrate 118

5 + no enzyme

6 + β Glucosidase (5 unit)7 + β GlcNAcase

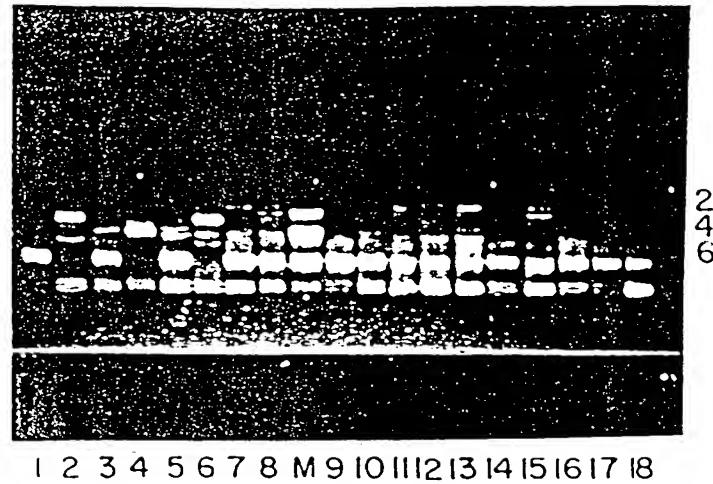
Substrate 202

8 + no enzyme

9 + β Glucosidase (5 units)10 + β Galactosidase

FIG. 12

13/17



Substrate: Gs 300

Lane Nos.

1. No extract
2. *Xanthomonas holicicola* ATCC # 13461
3. *Xanthomonas badrii* ATCC # 11672
4. *Xanthomonas manihotis* ATCC # 49764
5. *Xanthomonas cyanopsidis* ATCC # 55472
6. *Xanthomonas oryzae* ATCC # 55470
7. *Xanthomonas campestris* ATCC # 55470
8. *Xanthomonas campestris*

M: Markers (92b, 167, 197)

9. No extract
10. *Bacillus globigii* I
11. *Bacillus globigii* II
12. *Bacillus caldolyticus*
13. *Bacillus brevis*
14. *Bacillus stearothermophilus* Strain A
15. *Bacillus stearothermophilus* Strain B
16. *Bacillus aneurinolyticus*
17. *Bacillus sphaericus*
18. *Bacillus stearothermophilus* Strain C

FIG. 13

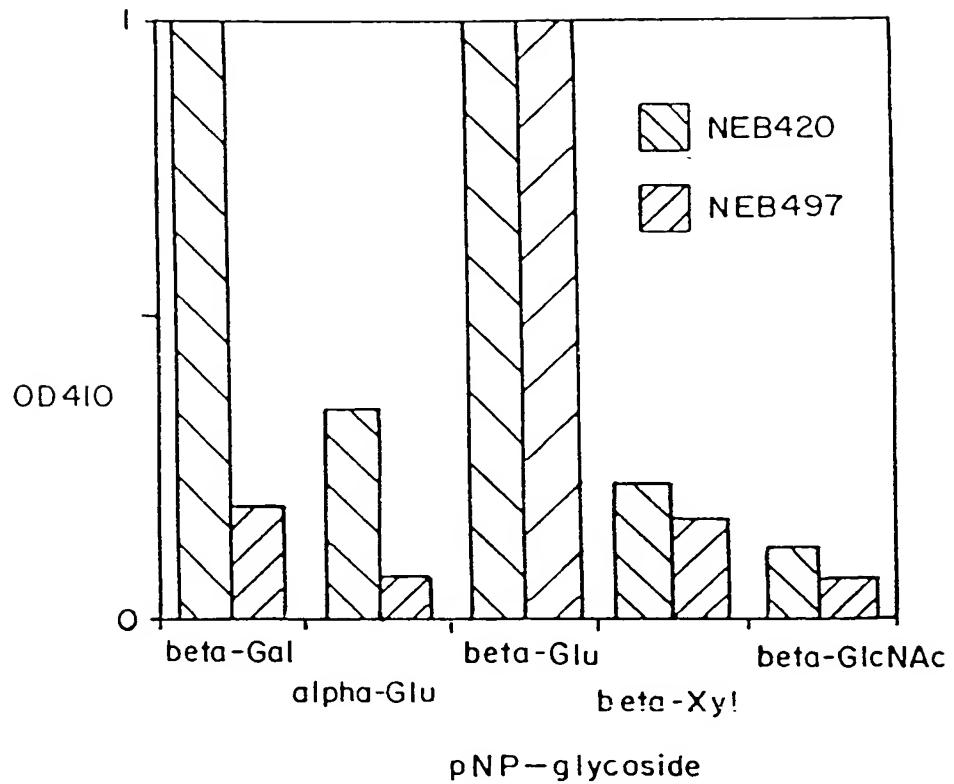


FIG. 14



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Substrate 202

- 1. No extract
- 2. *Xanthomonas campestris* NEB 420
- 3. *Xanthomonas campestris* NEB 497

Substrate 167

- 4. No extract
- 5. *Xanthomonas campestris* NEB 420
- 6. *Xanthomonas campestris* NEB 497

Substrate 180

- 7. No extract
- 8. *Xanthomonas campestris* NEB 420
- 9. *Xanthomonas campestris* NEB 497

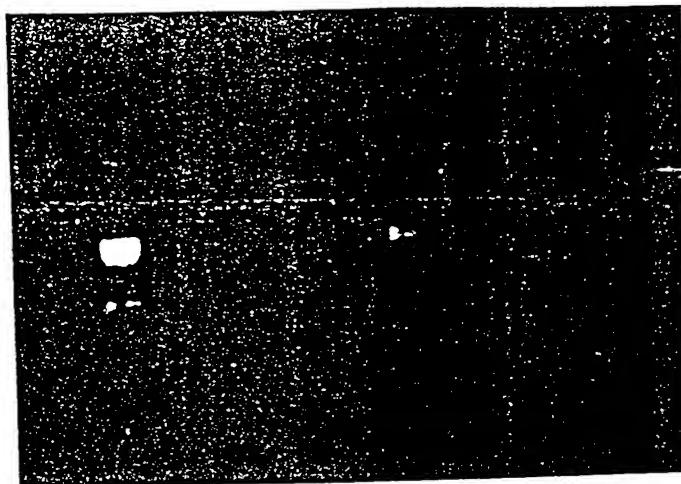
Substrate 179

- 10. No extract
- 11. *Xanthomonas campestris* NEB 420
- 12. *Xanthomonas campestris* NEB 497

Substrate 233

- 13. No extract
- 14. *Xanthomonas campestris* NEB 420
- 15. *Xanthomonas campestris* NEB 497

FIG. 15



M: Marker (191, 202)

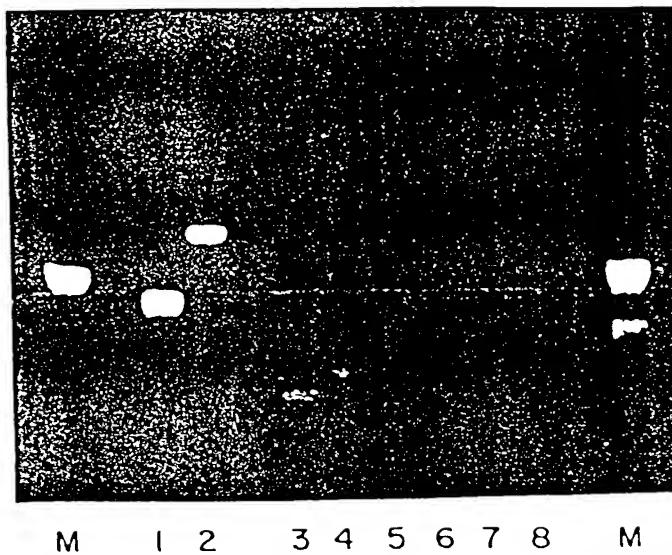
Substrate 300

1. No enzyme
2. 2 units α 1-2, 3 Mannosidase (*Xanthomonas manihotis*)
3. 2 units α 1-2, 3 Mannosidase + 5 units β -Xylosidase (*Xanthomonas holcicola*)
4. 5 units β -Xylosidase (*Xanthomonas holcicola*)

Substrate 264

1. No enzyme
2. 5 units β -Xylosidase (*Xanthomonas holcicola*)

FIG. 16



M: Marker (191, 202)

Substrate 259

1. No enzyme
2. 2.5 units β -Mannosidase

Substrate 300

3. No enzyme
4. 2 units α 1-2, 3 Mannosidase (*Xanthomonas manihotis*)
5. 2 units α 1-2, 3 Mannosidase + 2 units β -Xylosidase (*Xanthomonas holcicola*)
6. 2 units α 1-2, 3 Mannosidase + 2 units β -Xylosidase + 10 units α 1-6 Mannosidase (*Xanthomonas manihotis*)
7. 2 units α 1-2, 3 Mannosidase + 2 units β -Xylosidase + 10 units α 1-6 Mannosidase + 2.5 units β -Mannosidase (*Xanthomonas holcicola*)
8. 2.5 units β -Mannosidase (*Xanthomonas holcicola*)

FIG. 17